

REMARKS

In the Office Action dated April 7, 2006, the Examiner rejected claims 1, 6, 7 and 9-14 under 35 USC 103(a) as unpatentable over Lin (US Patent No. 6,483,147) and Lee (US Patent 6,081,037), and rejected claims 8 and 15-16 under 35 USC 103 as unpatentable over Lin and Mitani (US Publication 2003/0057491). Claims 1, 6-16 and 26 remain at issue.

The Art Rejection

The Applicants again strongly disagree with the Examiner's rejection. The combination of Lin and Lee, either alone or in combination, does not teach or suggest the present invention as claimed. The Examiner has therefore failed to demonstrate a prima facie case of obviousness.

Even if it were proper to combine the Lin and Lee references, the proposed combination does NOT teach the present invention as claimed. The Lin reference is directed to the formation of a heat sink in the bulk layer of a semiconductor device. The Lee reference is directed to the application of a heat spreader to the surface, not within a bulk layer, of a semiconductor chip positioned within the recess of a chip mount. The proposed combination would therefore result in the combination of (i) the chip of Lin having a metal, silicide, or nitride heat sink formed in the bulk layer of the chip; *and* (ii) the addition of a heat spreader attached to the surface of the chip. The proposed combination does NOT result in the present invention as claimed, namely the use of a thermally conductive paste to form a heat sink formed in the bulk layer of a semiconductor device.

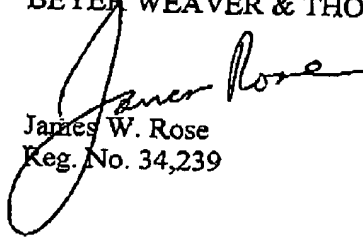
The Applicants again submit that it is improper to combine the two references as proposed by the Examiner. As noted above, the Lin reference is directed to a silicon device with a metal (either silicide or nitride) heat sink formed in the bulk layer of the device. Certain claims of the present invention are directed to a similar structure except the heat sink is formed from a thermally conductive paste. In contrast, Lee is directed to using a thermally conductive material to attach a heat sink onto the surface of a chip recessed within a chip mount. The two references are therefore directed to different approaches to removing heat away from a semiconductor chip. There is absolutely no teaching or suggestion in either reference that would motivate one skilled in the art to replace the metal heat sink formed in the bulk of the Lin device with the adhesive material used to attach a heat sink to the chip of the Lee device.

Lastly, in the Response to the Arguments, the Examiner's states that the Lee and Lin references can be combined since the (i) Lee reference is "*only disclosing the thermally conductive material being thermally conductive paste*" and (ii) and "*both disclose chips and a heat sink and both are in the same field of endeavor*".

With all due respect, the Applicants submit that the Examiner's stated reasons for combining the two references are improper for several reasons: (i) it is well established that references must be considered as a whole. It is therefore improper for the Examiner to use the Lee reference in this situation simply because it mentions the use of a thermally conductive material while ignoring the remaining teaching of the reference; (ii) there must be a teaching in one or both references to suggest the proposed combination. Again, in this situation, no such teaching or suggestion exists in either reference. While admittedly the two references are generally directed to the same field of endeavor, there is absolutely no teaching or suggestion in either reference to use the thermally conductive material used by Lee to attach a heat sink to a chip in place of the silicide or nitride used by Lin in the bulk of a semiconductor device; and (iii) the Examiner is misconstruing the actual teaching of Lee. The Lee reference, as noted by the Examiner, teaches the use of a "*thermally conductive material*". See specifically column 4, line 64. The purpose of the thermally conductive material is to attach a heat sink onto the surface of a chip recessed within a chip mount. The thermally conductive material is therefore presumably an adhesive of some type. The claims of the present invention, however, are directed to the use of a thermally conductive paste for use in the bulk layer of a silicon device. A thermally conductive material used an adhesive is not necessary the same as a thermally conductive paste as the Examiner emphatically states.

Applicant believes that all pending claims are allowable and respectfully requests a Notice of Allowance for this application from the Examiner. Should the Examiner believe that a telephone conference would expedite the prosecution of this application, the undersigned can be reached at the telephone number set out below.

Respectfully submitted,
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